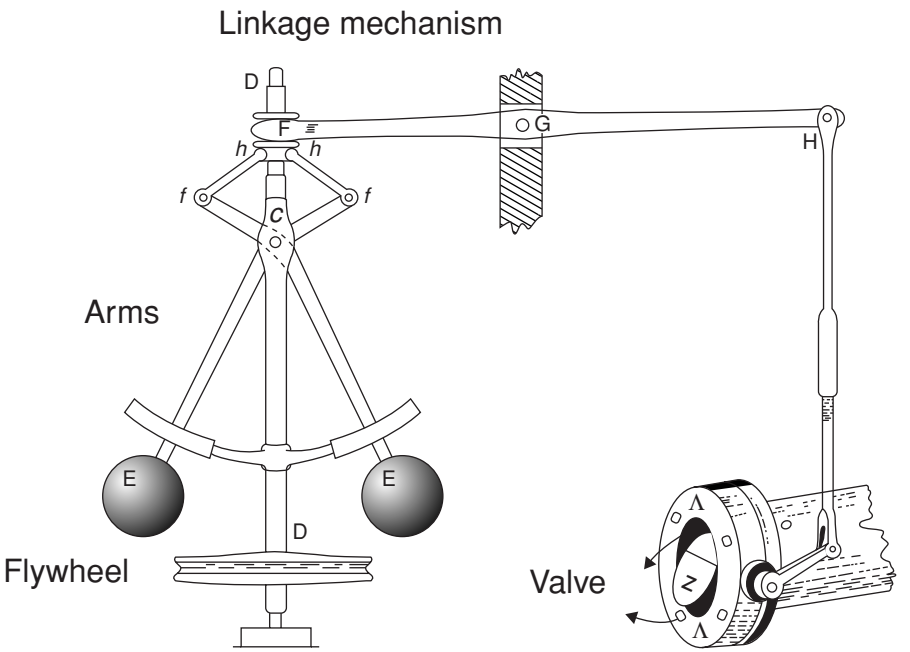

Figure 2.4. The governor James Watt designed for his steam engine. An upright spindle is attached to the flywheel. Connected to it are arms with balls which, by centrifugal force, will move further out the faster the flywheel turns. There is a linkage mechanism which ensures that the valve closes as the balls move further out, and opens as they move closer in. This ensures that steam will flow at the rate needed to keep the flywheel moving at the desired speed. Drawing reproduced from J. Farley (1827), *A treatise on the steam engine: Historical, practical, and descriptive*. London: Longman, Rees, Orme, Brown, and Green, p. 436.

Wiener and his colleagues did not view their contribution only as an advance in technological design (in fact, Wiener's design failed due to the limitations of available hardware in which to implement it, and his contract with the Department of Defense was terminated). Rather, they thought they had articulated a basic principle of purposive and teleological behavior, whether in animals or machines. Accordingly they published their results in the journal *Philosophy of Science*.[19] They acknowledged that the concept of teleology

[19] On their account, *purposeful* is more general than *teleological*. "The term purposeful is meant to denote that the act or behavior may be interpreted as directed to the attainment of a goal – i.e., to a final condition in which the behaving object reaches a definite correlation in time or in space with respect to another object or event" (Rosenblueth, Wiener, & Bigelow, 1943, p. 18). They then invoked feedback to differentiate teleological from non-teleological behavior: "Purposeful active behavior may be subdivided into two classes: 'feed-back' (or 'teleological') and 'non-feed-back' (or 'non-teleological')" (p. 19).